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BITSTREAM INCLUDING A
MOTION VECTOR AND
QUANTIZED DCT BLOCKS OF
RESIDUALS FOR EACH
ENCODED MACROBLOCK

FOR A QUARTET OF
MACROBLOCKS, COMPARE
MAGNITUDES OF THE
CORRESPONDING DCT
BLOCKS OF RESIDUALS

ESTIMATE A MOTION
VECTOR FOR A
MACROBLOCK RESULTING
FROM DOWNSAMPLING
THE QUARTET USING THE
MOTION VECTOR
CORRESPONDING TO THE
SMALLEST MAGNITUDE

FIG. 1a

BITSTREAM WITH
MACROBLOCK MOTION
VECTORS AND DCTs

FIELD
DCTs?

NO

YES

HORIZONTAL DOWNSAMPLE
TOP AND BOTTOM FIELD
DCTs SEPARATELY; AVERAGE
DOWNSAMPLED DCTs

VERTICAL
DOWNSAMPLE;
THEN HORIZONTAL
DOWNSAMPLE

MOTION VECTORS, ...

FIG. 1b

MOTION
VECTOR REFINEMENT
NEEDED?

NO

YES

MACROBLOCK
ALIGNED WITH REFERENCE
DCT BLOCKS?

NO

YES

SIX DCT BLOCK 16x18
SEARCH WINDOW EXTENDED
TO 18x18 BY PADDING; OR
FOUR DCT BLOCK 16x16
SEARCH WINDOW EXTENDED
TO 18x18 BY PADDING

NINE DCT
BLOCK 18x18
SEARCH
WINDOW

REFINE MOTION VECTOR

MOTION VECTOR OUTPUT

FIG. 1c

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BITSTREAM WITH MPEG-2 MOTION
VECTORS AND FRAME-DCTs

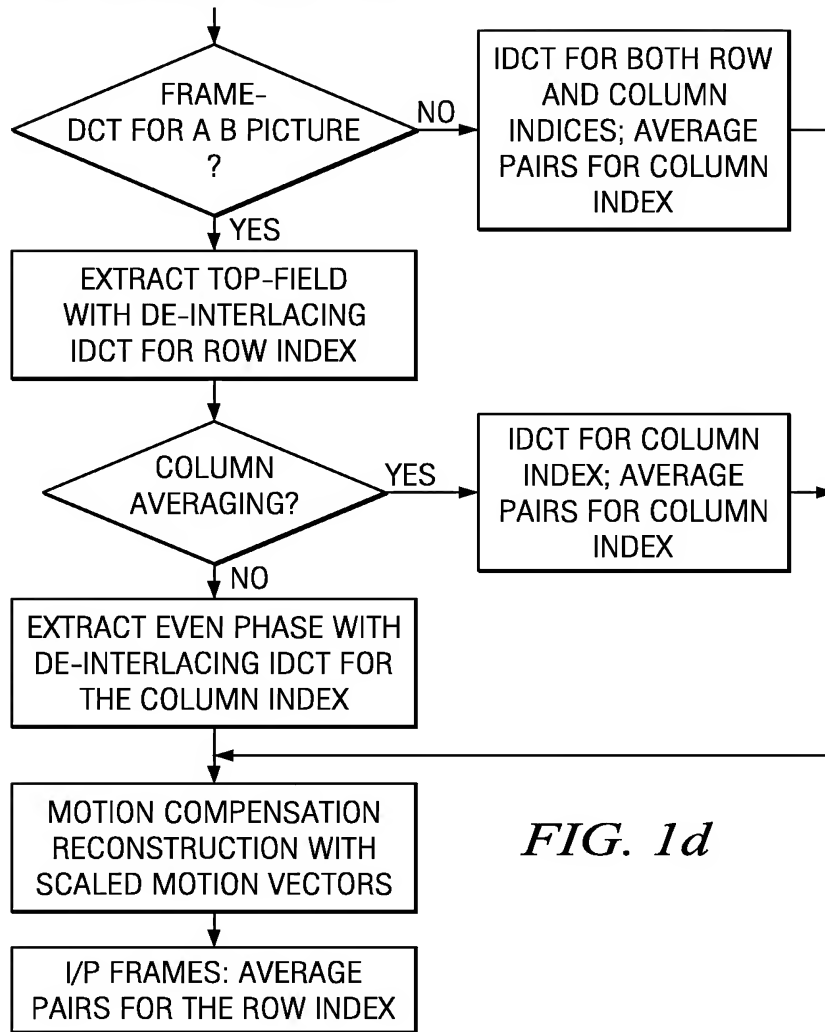


FIG. 1d

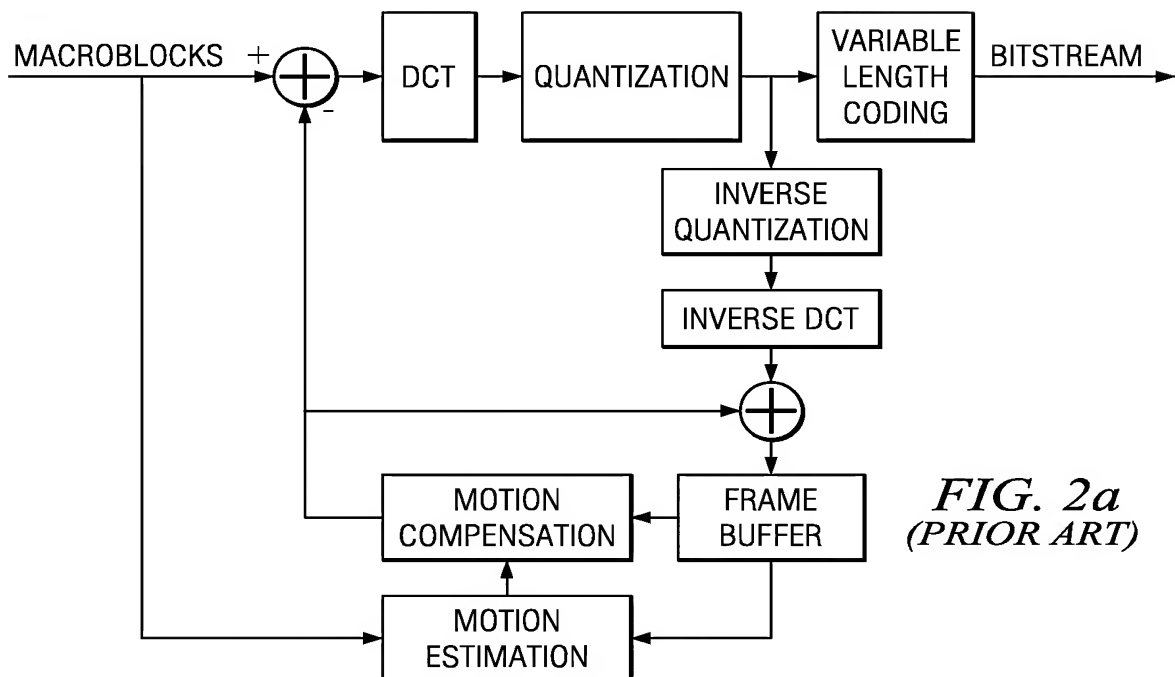


FIG. 2a
(PRIOR ART)

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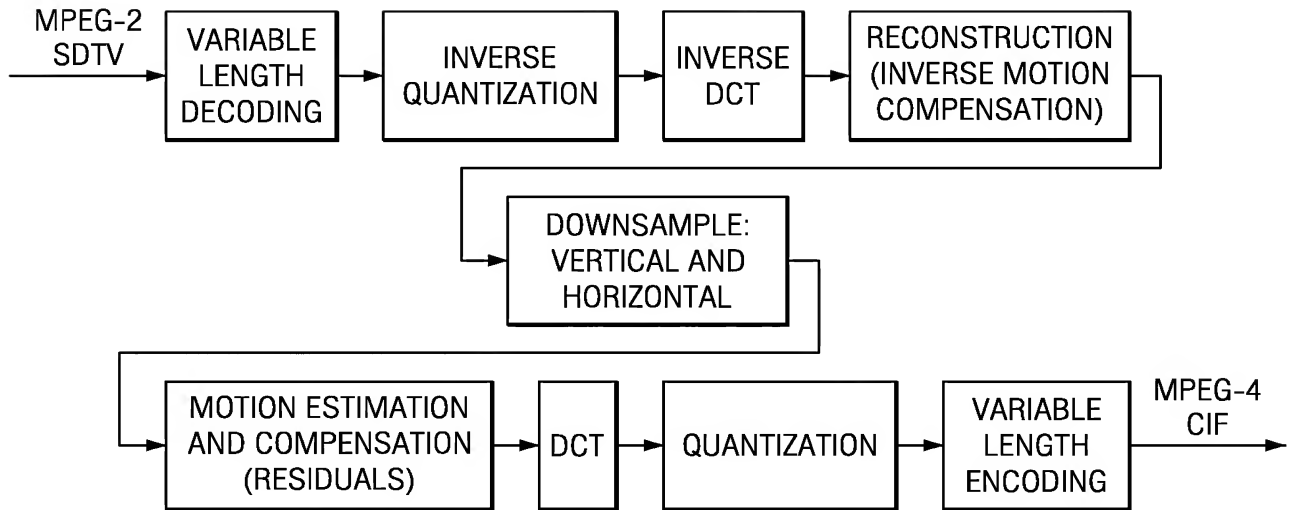


FIG. 2b
(PRIOR ART)

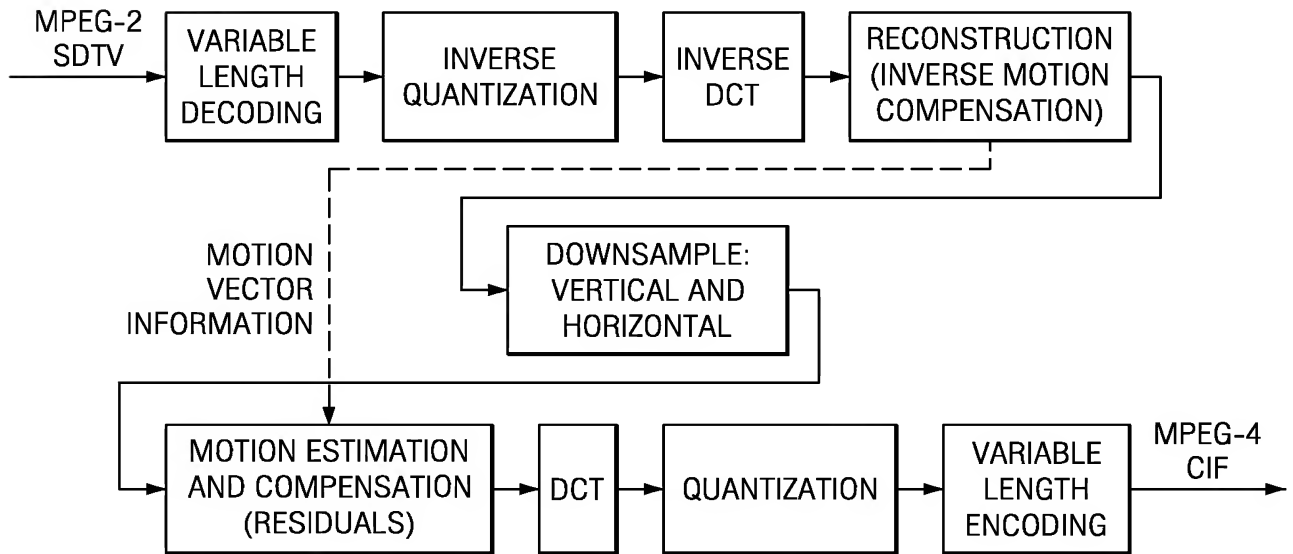
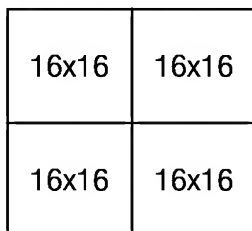


FIG. 3a

QUARTET OF MPEG-2
MACROBLOCKS



DOWNSAMPLE

MPEG-4
MACROBLOCK

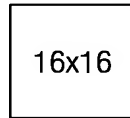
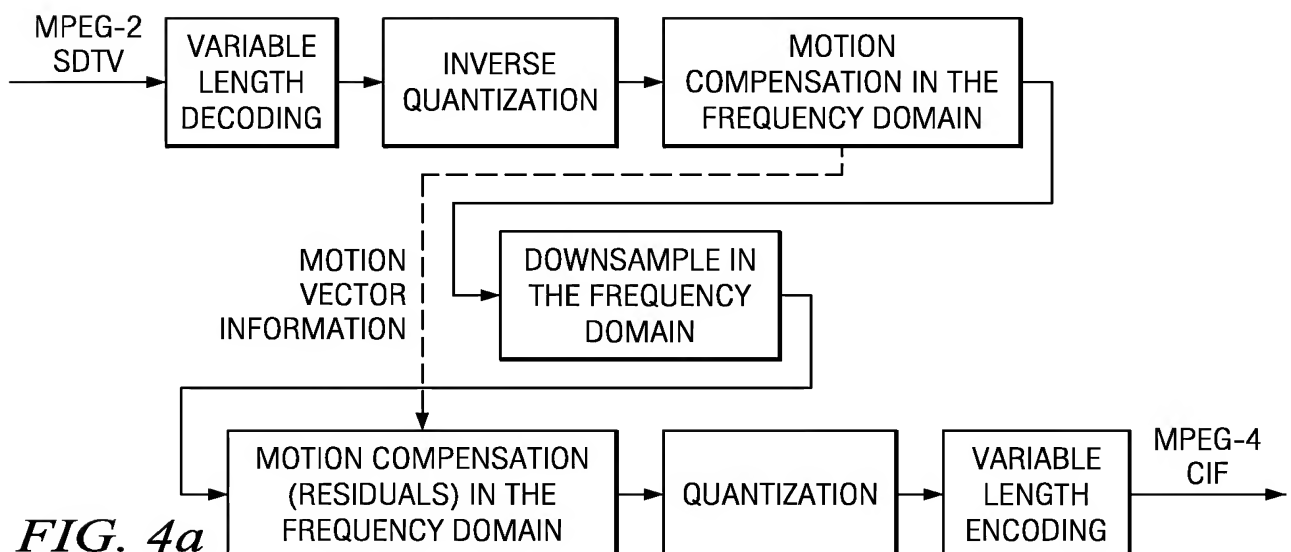
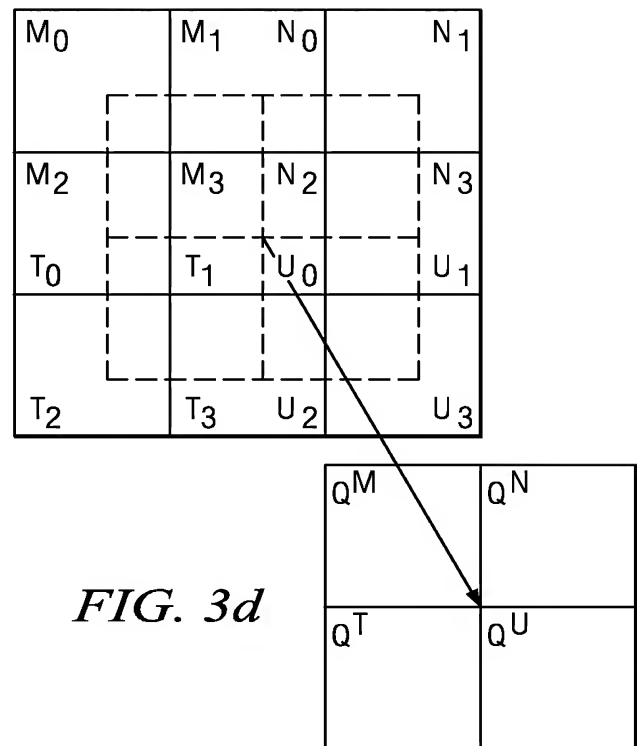
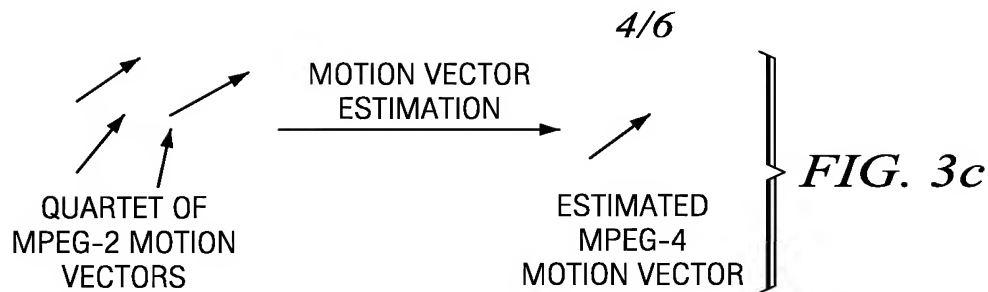
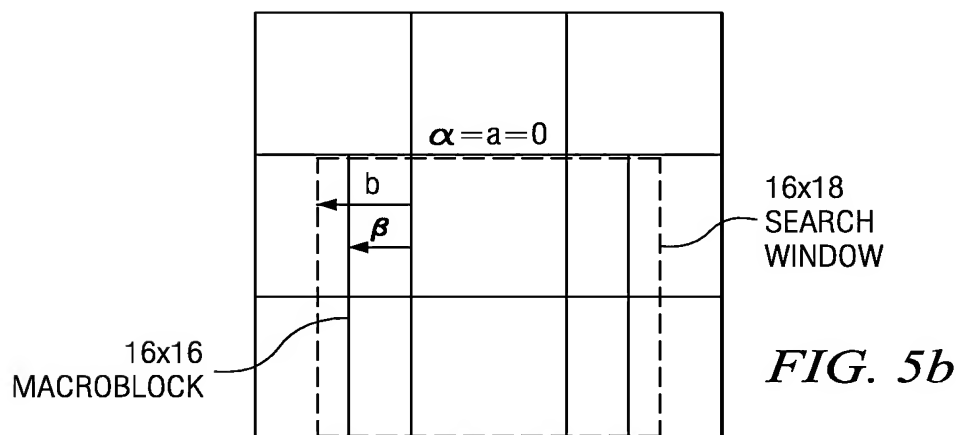
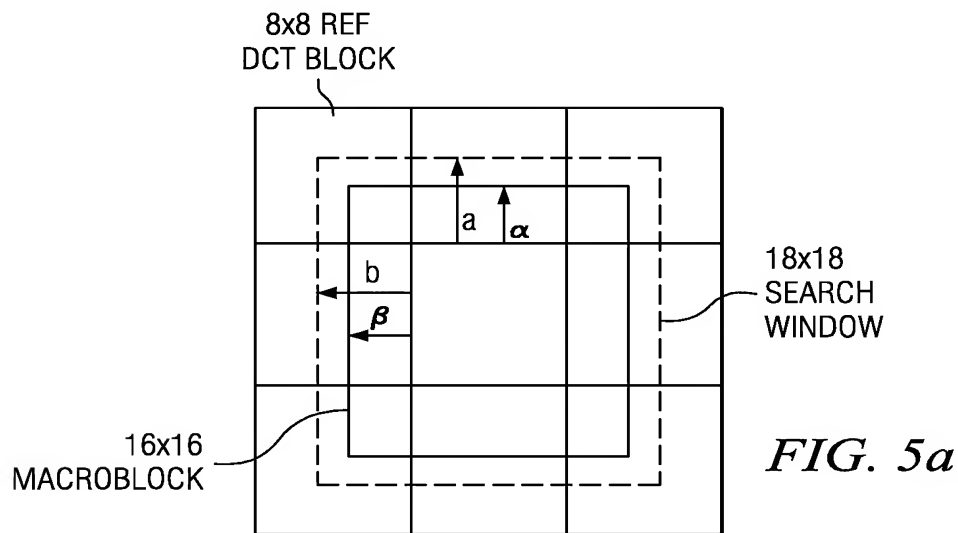
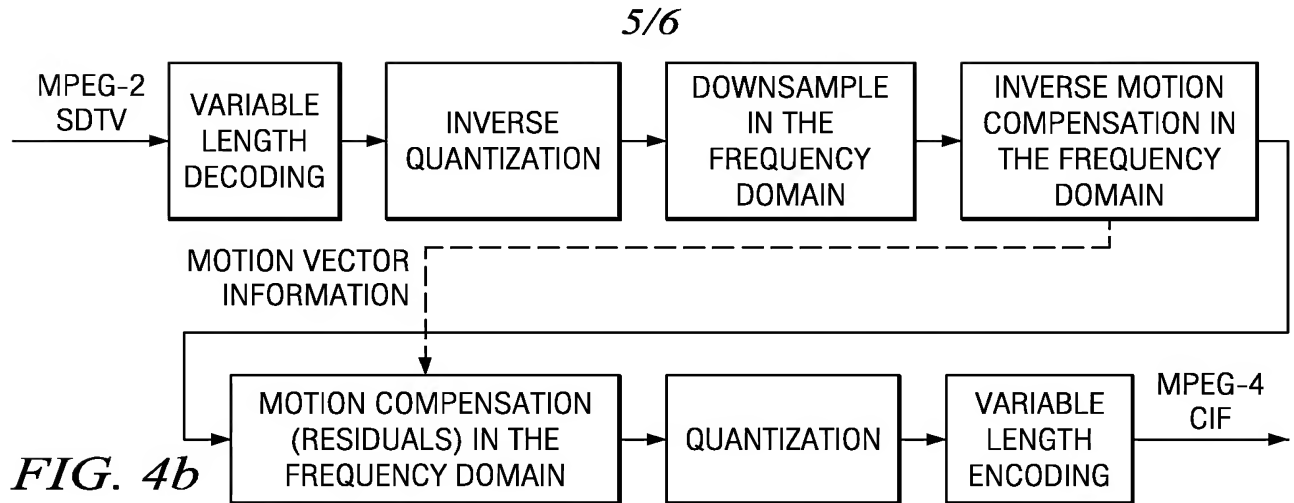


FIG. 3b





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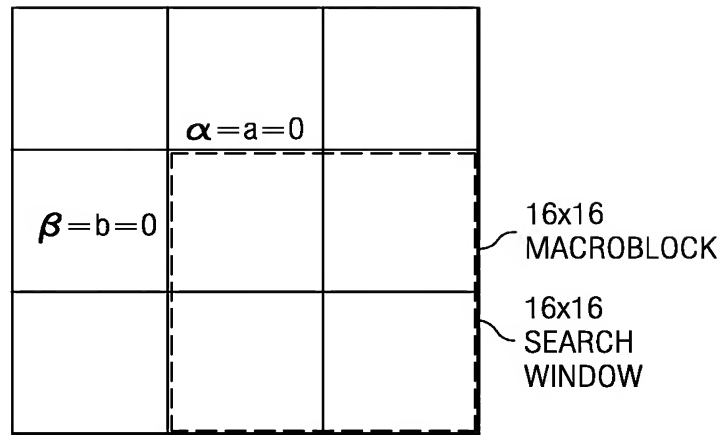


FIG. 5c

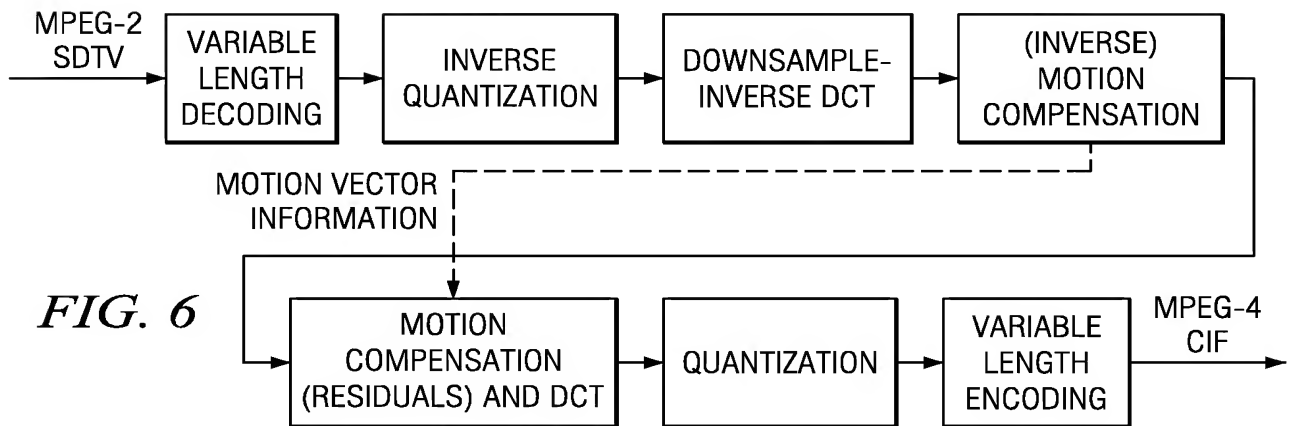


FIG. 6